

HARNESSING TECHNOLOGY FOR SCHOOL ACCOUNTABILITY: A CASE STUDY OF IMPLEMENTING A MANAGEMENT INFORMATION SYSTEM

Schools employ educational technology to comply with pressures for greater accountability and efficiency in conducting operations. Specifically, schools use *management information systems* designed to automate data collection of student attendance, grades, test scores, and so on. By definition, these systems "maintain, support, and provide inquiry, analysis, and communication tools that organize student accountability data into information to support the educational process" (Barrett, 1999, p. 4). For example, Daniels and Johnson-Ferguson (2001) reported using a computerized system to monitor student progress prior to year-end testing in Philadelphia public schools. Similarly, Wiley (2004) described how public schools in Maryland's Caroline County developed software for the school district to gather information about administration, students, and auxiliary services, consolidating those data in one place. The system provided information access and availability on demand to school and administrative personnel. As such, these management information systems (MIS) employed widespread use of technology to enable effective and efficient school operations in order to promote school accountability.

Beyond consolidating more information about students, automated information systems can provide communication to those outside the school. Parents as well as school personnel can check on school and student records when Internet access provides for more centralized student information (McIntire, 2004). Better communication was possible between school and home as reported in Telem's (2005) study about the effects of an MIS. Homeroom teacher and parent interactions were found to be more frequent, intensive, and formative as a result.

Despite the potential benefits of MIS usage in schools, implementing such systems has posed numerous challenges for users and often disrupted existing routines. Telem (1993) cautioned educators when appropriating business MIS models. He recommended more systematic and verifiable research to examine how MIS for schools can be utilized. Barrett (1999) reported on user perceptions that contribute to implementing an automated system in a southeastern Texas school district. He advocated the need for greater examination of such information systems to maintain student accountability data, particularly as school administrators might be evaluated on the basis of data collected and reported. Further, Klein (1986) proposed that information systems can demand much from school informants but offer little use of the resulting information.

Of school informants, three groups (classroom teachers, support staff, and administrators) generally participate in data collection and main-

tenance of a school MIS. Other groups such as students, parents, families, and resource personnel might be solicited for data but are not primarily responsible for the MIS. In this case study, we examined a California high school's implementation of an MIS and explored the perspectives of teachers, staff, and administrators.

The school, Oceanview High (a pseudonym), was mandated by its district to implement the automated system to collect student attendance. In an earlier study, we had examined two aspects of the student attendance routine that were altered over successive school administrations (Conley & Enomoto, 2005). The purpose of the current study was to explore in more depth not only administrators' but all three school informant groups' perspectives on the changes related to the MIS.

In analyzing our findings, we used literature on accountability (e.g., Marks & Nance, 2007), as well as an organization theory (Feldman, 2000) focusing on changing school routines. This theory provided a means to examine aspects of the existing attendance routine and changes that resulted from implementing the MIS (Conley & Enomoto, 2005). Our findings suggest that harnessing technology may be more challenging and less predictable than expected because of technological glitches, implementation demands, and individuals acting to meet accountability goals. We begin by describing how performance accountability has become a focus for public schools and which groups are held accountable for student achievement.

Lines of Accountability

Under the federal government's No Child Left Behind (NCLB) Act of 2001, performance accountability became a focal point for all United States school districts (U.S. Department of Education, 2002). States had monitored public school resources such as the number of library books and classroom computers since the mid-1990s, but with NCLB, accountability shifted toward student performance (Elmore, Abelmann, & Fuhrman, 1996; Fuhrman & Elmore, 2004; Linn, 2000). States were expected to provide an accountability plan to the U.S. Department of Education. By 2005, all 50 states had submitted their plans and were expected to implement them (U.S. Department of Education, 2005).

Increasingly, federal and state policies have held schools responsible for meeting performance standards and eliminating achievement gaps (Conley, 2003). States have also begun to rate their schools in terms of meeting yearly performance targets and publishing school report cards based primarily upon students' standardized test scores ("Quality Counts," 1999). For example, the State of California uses standardized test scores as well as a norm-referenced test based on state standards to compute an Academic Performance Index for each school (Timar, 2003).

Policymakers anticipated that schools would be given greater flexibility in terms of operations and resources if held more accountable

for student achievement. Those schools that made *adequate yearly progress* (AYP) would be duly rewarded, whereas consistently low-performing schools would be subject to appropriate consequences. Of the 50 states, 29 have legal authorization to close schools, take over instruction, replace staff, or apply other penalties to underperforming or failing schools (U.S. Department of Education, 2005). In practice, however, it is questionable how states actually rate their schools and whether there is sufficient capacity to make change. States might not have the resources to intervene in every school needing to improve its performance (Elmore, 2002). Further, it is difficult to assess the impact of accountability and not confuse reform efforts with other changes (Hanushek & Raymond, 2004).

Although NCLB established states as the unit of accountability, each state might have hundreds of school districts serving as educational authorities to ensure compliance and report on accountability. The one exception is the State of Hawai‘i with its single unified school district for the entire state (Hawai‘i Department of Education, 2006). The State of California, by contrast, reported having 979 school districts in 2004/05 (California Department of Education, 2006, p. 11). With so many school districts in charge of holding schools accountable to meet state standards and benchmarks, variations in policies and procedures may occur depending upon the number of schools, students, type of setting, educational issues, and so on. According to Marks and Nance (2007): “Because schooling is typically decentralized throughout states and school districts, policy environments contain a multiplicity of actors whose interpretation of state policies and view on implementing them may be in conflict” (p. 4).

The school and its personnel are at the most immediate level of accountability. As noted earlier, there are three groups of school personnel, namely teachers, support staff, and administrators, held responsible for instruction, assessment, and ultimately improving student performance. If schools are to demonstrate educational achievement, then these school personnel need to work toward that goal and report their progress to districts and state governments as part of their compliance. A management information system (MIS) would assist in that reporting process (McIntire, 2004).

Ensuring accurate data entry and update, classroom teachers are the first informants in creating a usable MIS. Despite this key role, teachers might be unable or unwilling to maintain an accurate computer-based accounting system. In part, this relates to how they have traditionally responded to using technology in the classroom. Studying high school technology usage in Northern California’s Silicon Valley, Cuban, Kirkpatrick, and Peck (2001) found that despite access through school wiring, availability of hardware and software, and distribution of equipment, teachers did not use computers in the majority of their academic classes. Cuban et al. (2001) contended that this was because high schools were organized in discrete blocks of time, making it difficult to use computers in innovative

teaching strategies. In an earlier article, Cuban (1998) proposed that computers have never been central to classroom teaching and learning, and thus are not deemed as important for teachers. It can be inferred that teachers would place data entry and maintenance low on their priorities during a class period. If so, how likely would they be to maintain student accountability data necessary for an MIS? Further, how reliable would data collected in such systems be?

The second informant group is the support staff, whose responsibility is to monitor data discrepancies and make corrections. At the school level, this might involve clerical staff in the administrative office, clerks in an attendance collection office, or support staff in the counseling office. Depending on the size of the school, there could be a designated individual or several individuals assigned to provide data entry, update, and monitoring. Crucial to ensuring the accuracy of an MIS, support staff are often overlooked and there seems to be little research on their responsibility and work.

The third informant group consists of school and district level administrators responsible for implementing an MIS. This group ultimately is responsible for overseeing operations, monitoring data input, and generating reports on student performance. They may be in charge of deciding how systems are to be implemented. For example, administrators might determine what specific resources (personnel, materials, time, and money) can be allocated to whom and when in order for changes to occur (Feldman, 2004). Using a national database on schools and staffing, Marks and Nance (2007) examined how principals acted as decision makers in reforming instructional as well as supervisory practices. The researchers studied how the contexts of accountability (federal, state, district, and school levels) might vary and affect principals' ability to make systemic changes. According to Barrett (1999), as school organizations implement information systems to maintain student accountability data and as administrators are evaluated on those data, more research is needed to provide insight into how they guide successful implementation and promote effective use of such systems.

When attendance data in an MIS are collected repeatedly, the process can conform to what Feldman (2000) described as an "organizational routine," repetitive, recurring but "inevitably [involving] a range of actions, behaviors, thinking and feeling" (p. 622). Individuals enacting routines will not only act in habitual ways but might change their actions as a result of reflecting upon outcomes (Cohen & Bacdayan, 1994; Eisenhardt, 1989; Feldman & Rafeli, 2002; Gersick & Hackman, 1990; Pentland & Reuter, 1994). They would be likely to demonstrate individual agency and initiative as needed and deemed appropriate (Feldman, 2000). Drawing upon this organizational routines theory, we hoped to consider how school personnel were making changes to accommodate and implement the new MIS. See Conley and Enomoto (2005) for a more descriptive explanation of this theoretical framework.

Method

Case Study

This qualitative case study was initiated because, as researchers, we were interested in the changes to Oceanview's attendance taking procedures and practices. According to Crossan and Berdrow (2003), settings for case studies might be selected if instructive of the organizational phenomena being investigated. Also, case studies are helpful in exploring a "bounded system" delimited by time and place (Stake, 1995). Accordingly, we selected this particular high school because, having undergone several changes to its attendance routine, its current administration was interested in taking action, assessing what was working, and perhaps doing things differently as a result.

Our research spanned three different school administrations and enabled us to take a longer view of the changes over time (Conley & Enomoto, 2007). We initiated our study at Oceanview High in summer 2003, soliciting data on the school's attendance procedures as implemented by a newly appointed administrator who had come from outside of the state. By spring 2005, a subsequent administrator was in charge and tasked with implementing the new MIS. He later retired to be replaced by the current administration. For this article, we focused exclusively on the implementation of the MIS to collect attendance data.

In gathering data for this study in 2004/05, we conducted on-site interviews with four school administrators, seven teachers from each academic department, two office assistants, a campus safety officer, and a district official. We also met with faculty in a focus group. Over several interviews, we asked questions about the school, attendance procedures in place, the MIS system, changes made over different administrations, and how those changes appeared to be working. Transcripts of recorded interviews were made, and when possible, reviewed by interviewees. Additionally, numerous school documents such as accreditation reports, self-studies, and policy manuals were examined to understand the school and its setting, the challenges facing the school, and the routines in place.

Our analysis consisted of making a detailed description of the case and its setting based on interview data. We attempted to capture the "richness, complexity, and gestalt of the material" (Charmaz, 2002, p. 691) by placing an emphasis on developing a conceptual analysis of the material as opposed to presenting each participant's perspective on attendance routines in its entirety. We relied upon the recollections of the teachers, staff, and administrators, often citing their own words. We also used documentary data to verify the alterations in routines made at the school.

This approach has precedent in previous research on organizational routines as demonstrated in Feldman's (2000) residence hall study. Her research progressed from "detailed descriptions" (p. 615) of the residence

hall organization to the theory that explained why routines changed as they did (Conley & Enomoto, 2005). Rather than doing things in routinized or habitual ways, organizational members might demonstrate more dynamic, individualized responses to taking action. We found this perspective to be relevant to how school members in this case study were attempting to implement the MIS and respond to the demands of accountability.

In the discussion section, we used organizing questions derived from Feldman's (2000) organizational theory on routines to identify actions taken to alter attendance taking. Changes occur (a) when actions do not produce the intended results or when problems occur, and thus demand a *repair* of the routine; (b) when actions produce new resources or opportunities, thereby fostering a desire to *expand* the routine; and (c) even when intended outcomes are achieved but improvements are sought, resulting in *striving* for more. These three types of change responses—repair, expand, and strive—may occur to any given routine or aspects of that routine. Examining how individuals resisted change as well as responded, we were able to explore shared understandings through connections among people (Feldman & Rafaeli, 2002).

School Setting

Oceanview High School was located in Seaward School District (pseudonym) in central California. With a local population of approximately 48,000, the district served 11,000 students in Grades K–12 from five communities as well as adjacent rural areas. There were ten elementary schools, three middle schools, and three comprehensive high schools of which Oceanview High was one.

Like all schools in the district, Oceanview High maintained a strong academic tradition. It achieved top-ranking status in the county and had exemplary programs in ocean sciences and technology. The school's enrollment in 2004/05 was approximately 1,500 students in Grades 9–12, representing a 25% increase over a six-year period (Western Association of Schools and Colleges, 2005, p. 2). In terms of racial-ethnic backgrounds, the student body was about 60% Caucasian, 26% Hispanic, 7% African American, 5% Asian-Pacific Islander, and 2% American Indian/Alaskan Native. Overall, the student body was 40% minority, and 18% qualified for free or reduced lunch subsidies.

There were 70 teachers, 67 of whom were fully credentialed and met the State of California guidelines for certification. At the start of the 2003/04 school year, 70.2% of core academic classes were taught by NCLB-compliant teachers (High School Accountability Report Card, 2003/04, p. 2). Over the next four years, 25% of the teaching staff retired, and new teachers were hired to fill vacancies. The school also attracted a number of alumni to teach there.

When the MIS was being implemented, the school was led by a

principal with 32 years as an educator, having taught at Oceanview for much of that time. He served as principal for two years and led an administrative team that included one assistant principal, a dean of students, and an activities coordinator. The team was supported by several office staffers and three counselors, all of whom were housed together in one administration office. According to the High School Accountability Report Card (2003/04), leading Oceanview High was viewed as “a responsibility shared among district administration, site administrators, instructional and clerical staff, students and parents” (p. 3). Ideally, the members of the school community included parents, businesses, and community groups who would support school district efforts to “ensure instructional programs consistent with students’ needs and comply with the district goals” (p. 3).

Management Information System (MIS)

In high schools, attendance taking is a routine that occurs in a “recurring pattern” among school members who perform organizational tasks (Feldman & Rafaeli, 2002, p. 311). At the start of the period, classroom teachers recorded those present and absent. If a student was late to class, s/he was marked tardy. With too many absences or tardies, students might be subject to disciplinary consequences. They could be retained after school or given in-school suspension for a period of time. Further, the school might be cited for having too many student absences, particularly with funding allocation based upon Average Daily Attendance (ADA) formulas. That is, the ADA often determined how much a school would be allocated in funds for a given school year. The more absences, the less money for the school. In addition to state requirements, the NCLB regulation identified attendance as a factor in rating success in schools, making attendance taking part of accountability (U.S. Department of Education, 2002). While necessary and important, attendance taking alone would not be sufficient for a school to demonstrate student achievement.

To support attendance taking, Seaward School District mandated that all 16 of its schools implement a management information system. Costing \$300,000, the system would contain student profiles including parent contact information, grades, attendance, unexcused tardies, and test scores. It was anticipated that the MIS would eventually include a grading component, enabling teachers to enter student grades as well as attendance. The idea was to have a districtwide data management system to serve all students from elementary through secondary grade levels and provide a repository of relevant student information.

Piloted first in the elementary schools, the MIS was implemented in all secondary schools in fall 2004. It replaced an optical scan system using bubble sheets and a scanning device that had been in place for at least 15 years at Oceanview. Because of the new system, teachers, support staff,

and administrators had to adjust to the changes. To describe the MIS, a science teacher explained the procedure in this way:

You go online on the Internet and post attendance electronically. It goes straight to the attendance clerks at the office if this is done by each teacher. This is a change from before when they used the bubble sheets. You need to sit at your computer to do it.... I would do it during the class but not necessarily at the beginning of class.

The benefits of the computerized MIS system were many. Several teachers commented about how the system was relatively easy to use. For example, a Special Education teacher who taught several different subjects within the same period could easily input attendance for the class as a whole using the MIS. Teachers could also access more student-parent information such as home and work phone numbers for contacting parents. With data available through the MIS, teachers could access data more quickly than previously when only the administration retained the information.

For school administrators, the information was especially helpful on test days when 95% student attendance was expected. The activities coordinator in charge of testing commented, "We can know in the first 10 minutes of class if this is a student who is not here today. We have to get that person here [to take the test]." In addition, retrieving reports based on student attendance data was "fantastic" according to the assistant principal.

For those at the district level, all school information could be consolidated and presented in desirable reporting formats, disaggregated by student groups and schools. The new system also involved staff from the school district attorney's office in meetings with the parents when students' absences and truancies were excessive. This was making the high school more transparent to the district's oversight and monitoring.

Findings

The themes that emerged from this case related to how school members connected attendance with student achievement and funding, how the MIS presented numerous challenges, and how individual school and district members responded to the system.

Attendance Linked to Achievement and Funding

Oceanview High School was required to monitor student attendance on a daily basis as a measure of accountability. School documents stated, "Regular daily attendance is a priority at Oceanview High School. The attendance clerks, community liaisons, [and] teachers all monitor student attendance very closely. Parents are notified of absences through phone calls, letters, and conferences with the Principal" (High School Ac-

countability Report Card, 2003/04, p. 8). As noted, good attendance was duly rewarded with prizes and acknowledgment; poor attendance was punished with parent notification, detention, or administrator review.

The school personnel expressed the need for this attention because of student achievement. For teachers, attendance was tied to grades or at least should be. A long-time business teacher at Oceanview commented that some students attended school for 132 days out of 180 (73%) yet received an A grade. “If you have an A [grade] with that, what does that say about your curriculum?” Another teacher said that students knew “If they miss my class they’re going to be behind. And that just makes things harder.” For these teachers, it was clear that being present in class connected with student learning and related to achievement.

The principal shared a similar belief, relating attendance to achievement, with every minute in the classroom valued. “Time in class is the most precious...for children who come from disadvantaged situations, more minutes in class means increased learning.” Another administrator, the activities coordinator, remarked that attendance was a “huge part” of getting students to graduate. In his words, “Kids are failing because they are not here.” Monitoring attendance meant keeping track of those who were present, absent, and tardy to class, a reporting function that was to be checked by administration and staff members.

The attendance clerk spoke specifically about how attendance translated into the school’s funding. She commented about teachers who did not post attendance in a timely manner. “I understand their focus is teaching. It’s not attendance [but] that’s how we get our money...by attendance.” Attention to attendance recording in routinized and consistent ways ensured that the school would receive its funding allocation.

Challenges With the Technology

All three groups of personnel commented about the challenges they faced implementing the MIS and the changes in routine that resulted. Experiencing frequent computer downtimes, many teachers had problems entering data into the system. As one teacher stated, “You’re at the mercy of the computer and if there is a problem with the computer that’s a problem.” Teachers complained that computers shut down automatically soon after they marked class attendance and needed to be rebooted if a student was marked absent but came late to class. Although teachers could send a correction slip to the office, this generated more work for the attendance clerks. Downtimes might occur once a month or more. The history teacher felt that “It just seems like when it does happen, it’s [usually] my computer and it’s down for like the whole day.”

A related challenge facing teachers was having to use outdated computer equipment. The assistant principal stated that some of the computers were “very old, like five years old.” An English teacher reflected on

having a “very old” computer that would go down after a relatively short time. “After 20 minutes you have to start all over.” Likewise, a history teacher commented that he made adjustments as needed. “Well, my computer is a little slow and because [the MIS] is on the computer I don’t actually get to the [data entry] at the beginning of the period.” He resorted to using a seating chart to write down names of students absent and would input them at the end of the day.

According to the office staff, many veteran teachers resisted using the computers. “Teachers who have been here for years don’t like the computers so much.” The attendance clerk noted that at least four or five teachers did not post their attendance on a daily basis and would require follow-up. Moreover, when computer problems occurred, teachers had to submit paper attendance that would need to be input by the office staff. Substitute teachers also would need to have their attendance data manually input because they were without passwords and not accommodated in the MIS. This was generally not a problem when there were few substitutes but when they were covering an entire department, the office staff had to process paper attendance sheets for each period (5-6 substitutes teaching 6 periods or as many as 36 sheets of data), creating a substantial workload increase for the staff.

In many ways, the office staffers served as intermediaries between the classroom teachers and the administrators. They were responsible for monitoring teachers’ input of attendance and had to follow up when there were errors, missing data, or substitute teachers. All corrections were done via their office computers so that when the system went down, the work of the attendance staff was also delayed. Consistent with the notion that conflict in interests may occur among multiple actors implementing policy (Marks & Nance, 2007), the staff had little recourse when teachers failed to submit attendance, errors needed to be corrected, or the system went down. Their workload frequently was overwhelming.

For their part, the school administrators needed to ensure that attendance taking was done consistently. But the classroom teachers were generally inconsistent in the manner of their reporting. For example, one teacher often recorded attendance after “giving the kids a warm up [activity]” and he could adjust for latecomers by marking them tardy rather than absent. Another teacher spoke of noting students who were absent and inputting attendance at the end of the day. The administrators recognized that they needed to address these variations if they were to monitor classroom attendance adequately.

In response to teacher complaints about the technological glitches, administrators tried to obtain updated computers for everyone. The physical education teacher commented that the principal was doing everything possible. “When we were having our computer problems I went to [the principal] and said, ‘look we need help.’ Bang, he got us a laptop. So any teacher thing that we need, [the principal] is there. He’s great.” Acknowl-

edging that some computers were “so bad, so bad,” the principal often employed creative solutions, like authorizing computers designated for accreditation to be used by teachers to enter grades. “Yeah, I gave it to a teacher who can’t put her grades in because we don’t have adequate computers here.”

Responses From School Personnel

In responding to the MIS, school personnel demonstrated individual agency and initiative consistent with organizational theory on school routines (Feldman, 2000, p. 622). Using the bubble sheets in the optical scan system, a teacher could easily “bubble in” absences and tardies throughout the class period. With the new system, when the computer went down, teachers demonstrated initiative by getting paper attendance sheets from the office. According to a third-year history teacher,

Ideally I would have some back-up sheets with my students’ names on them so I could just take roll if the computer’s down. Once, I did that and was prepared. But I never went back [to the office] to get new sheets. So now it’s like, I get behind. It’s like, dang I forgot to take roll. I’ll take out a slip of paper, because I enter attendance at the end of the day anyway, but I won’t have the sheet [the office] needs.

Office staff also demonstrated considerable agency in responding to the computerized system. For example, the MIS still generated paperwork when substitute teachers took attendance, when the computer system went down, or when teachers did not post attendance as they should. Additionally, paper records were still required to comply with state policy. According to Seaward District personnel in charge of attendance and records, the State required teachers to sign attendance forms each week. Therefore, the staff retained this artifact from the older paper system to maintain attendance taking and thereby comply with policy.

Administrators, too, demonstrated responsiveness as they ensured that there were adequate computers, little or no downtimes, sufficient information technology support, and more support for the office staff. Moreover, the administrators recognized that the MIS provided more of a distraction from teaching. According to the principal, “Every single thing that gets in the way of your teaching destroys your classroom environment.” Thus, his job was to find more help to get the system running, supporting the teachers’ return to teaching.

Ultimately the burden of attendance recording and monitoring fell upon the small office staff. There was one full-time and one part-time clerk in the attendance office. When asked how it affected her work, one attendance clerk said, “It’s made it really awful sometimes. Now the program itself would be wonderful if we were in a perfect world. But we’re not.” Among the problems cited were computer system failures, teacher resis-

tance or failure to input attendance, substitute teachers or special education teachers who were required to input attendance manually, and “bugs” to be worked out in the MIS. As the focal point for attendance, office staffers were responsible for making sure that data were input in an accurate and timely manner. Attention was focused on making sure that the MIS was implemented. “We have a [new] attendance system and it’s sort of been trying to get it up and working.”

According to the school district official responsible for the system, things appeared to be “working very well” despite the problems, particularly as the high schools were implementing the program. At the secondary school level, there were more truancy issues and more specialization needed to document who was where than at the elementary schools. Personnel were also more specialized. For example, a high school counselor might only need data from one part of the system in contrast to the elementary school office staff being responsible for everything. But the district official said that the MIS “gives administrators a tool [from which] they can get information, but it is in the infancy stages of implementation.” It was anticipated that by the next school year, the system would be fully networked and implemented.

Discussion

In this case study, we examined how Oceanview High personnel responded to its school district mandate to implement a management information system. The MIS was designed to facilitate school and district accountability by consolidating data for the school and enabling district personnel to retrieve student attendance data. Eventually, all student performance data for all schools in the district would be included in the computerized system.

As our findings suggested, harnessing the technology was perhaps more challenging and less predictable than anticipated. There were technological glitches with frequent downtimes and inadequate computer equipment for use by teachers. Further, some teachers resisted the new automated system; others needed reminders to submit their daily postings on time. The burden of ensuring accurate student accounting ultimately fell upon the small office staff designated to monitor and correct input errors. The administrators were charged with supporting teachers but needed to ensure that the office staff could do their work in a timely manner. Although viewed as being very supportive of both teachers and clerical staff, the principal was still challenged to get everyone to comply and take attendance using the MIS.

Attempting to identify how and why alterations occurred, we found Feldman’s (2000) organizational theory about school routines to be quite applicable. According to this theory, changes in routines occur to repair outcomes and/or problems, expand upon new possibilities, and strive

for improvements not yet realized. In analyzing the data, we first considered whether results of the routines were consequences that were unintended or undesirable, thus indicating the need for a repair of the existing routine. For example, many teachers adjusted their attendance taking with the new MIS because of such problems as dealing with computer down-times, needing to reboot in order to restart the system, and correcting student input for tardies rather than absences. These necessary but not always successful repairs still resulted in inconsistent attendance recording and reporting that affected the office staff as well as administrators.

We next considered whether changes in the routines indicated the desire for expansion and striving. According to Feldman (2000), the concepts of expanding and striving reflect what is “ultimately desired in the organization” (p. 620). For example, the concept of expanding proposed that routines change when possibilities or new opportunities are considered (Feldman, 2000). As evident in teacher comments, the MIS did make more student information accessible to teachers as well as to the office. This accessibility might result in better communication with those outside the school (McIntire, 2004; Telem, 2005). As noted, the Seaward School District’s plan was to have students’ grades, records, and achievement data incorporated in the system for improved districtwide data management.

In terms of striving toward attendance goals, an improvement not fully realized was that the system would be both fast and efficient. As originally envisioned, all attendance data would be submitted to the office using the MIS. However, substitute teachers did not have passwords to enter the system and some teachers did not post attendance as they should. The staff’s efforts to retain paper attendance taking not only met state policy but constituted striving toward improvements in efficiency. With paper as an option, the processing of attendance could still occur. When teachers did not input attendance electronically for whatever reason, attendance could be submitted using the paper sheets. The concepts of expanding and striving thus allow researchers to look beyond repair to examine change in routines as sources of continuous change and potential organizational learning.

Conclusion

By examining how technology was utilized for accountability, the study of Oceanview High suggested that lines of accountability might be less clear cut, more intersecting, and ultimately more beneficial for the school. At the outset, it appeared that the high school was responding directly to Seaward School District’s mandate to implement the MIS. Indeed, that was the stimulus for changing the existing attendance routine.

However, given technological glitches, individual agency and initiative, resistance, and/or overworked staff, school members were more inclined to respond to their immediate concerns and priorities than to the district at large. This was the case for the classroom teachers who tried to

accommodate the MIS by adapting their ways of attendance taking, adjusting when they would input data or making corrections for latecomers. In our findings, we noted how individual teachers' actions (or inactions), often in response to computer problems, caused inconsistencies in how attendance was taken, when data were input, and how office staff needed to correct errors or follow up. The administration also demonstrated independent action as evident in how the principal negotiated new computer equipment for teachers and office staff. In this way, we propose that the three school informant groups operated as intersecting lines of accountability. They were not discrete entities with all teachers, for example, operating in the same ways. Nor were the groups coordinated to act as a singular school unit. Perhaps in time, the school personnel would act more routinely.

Seaward district administration needed to monitor the data input and ensure compliance by all schools. There appeared to be some recognition of the differences between implementing the MIS at the secondary schools and at the elementary schools. Also, district management recognized that it would take time to "iron out the bugs in the system," and they hoped to work with the schools to do so. The lines of accountability seemed to become less clear cut when considering how the district would support the school by providing the necessary resources for computer equipment, personnel, and support services to make the system efficient and operational.

We believe that the ambiguity resulting from Oceanview's implementation of the MIS might have encouraged independent activities on the part of school personnel. Individual agency (Feldman, 2000) and the multiplicity of actors involved in implementing policy (Marks & Nance, 2007) can alter everyday organizational life. With little direction from Seaward School District and perhaps even less support to handle technology challenges, the school personnel could act independently. This might have encouraged repairing, expanding, and striving toward implementing the MIS, thus accommodating what was most workable and desirable at Oceanview.

Further empirical research might investigate what happened in the other two secondary schools under the same mandate to implement the MIS throughout Seaward District. Also more data should be solicited about the district administration's perspective on the phase-in of the computerized system, support provided from the district, and evidence of desired outcomes. Over time, it would be interesting to see whether technology problems were corrected and the system was able to make student information more widely available.

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